[0097] use of the pre-chamber **26**, positioned in the centre of the combustion chamber **15**, at full load, namely during normal operation of the engine **1**, with lower risks of detonation and rapid combustion; and

[0098] improvement of homogenization of the air-fuel mixture exploiting the arrangement of the injector **22** in counterflow to the air entering the combustion chamber **15** through the intake port/s **16**.

[0099] In short, the engine **1** allows high performances to be obtained (due to the presence of a pre-chamber **26** positioned in the centre of each combustion chamber **15**) and reduced emissions of polluting substances (due to the arrangement of each injector **22** adjacent to the respective spark plug **24**, thus implementing the spark coupled injection strategy at low load, and due to the arrangement of each injector **22** in the outlet region **11***b* of the head **11** with generation of an air-fuel counterflow during the fuel intake phase).

[0100] Lastly, it is clear that modifications and variations can be made to the engine **1** and to the control method of said engine described and illustrated here without thereby departing from the protective scope defined by the claims.

1. An internal combustion engine (**1**) for a motor-vehicle comprising:

at least one cylinder (**2**) having a longitudinal axis (A) and adapted to receive fuel and air for carrying out an engine cycle including a combustion reaction of the fuel itself;

at least one intake duct (**6**) adapted to feed said cylinder (**2**) with fresh air, through at least one intake port (**16**);

at least one intake valve (**20**) acting on said intake port (**16**) for controlling the airflow entering said cylinder (**2**);

at least one injector (**22**) that can be selectively activated to supply uncombusted fuel to said cylinder (**2**);

at least one exhaust duct (**8**) communicating with said cylinder (**2**) through at least one outlet port (**18**) for removing from the cylinder (**2**) exhaust gases formed at the end of said combustion;

at least one outlet valve (**21**) acting on said outlet port (**18**) for controlling the flow of the exhaust gases at the outlet of said cylinder (**2**); and

a piston (**12**) mounted in a linearly sliding manner along said longitudinal axis (A) within said cylinder;

wherein said intake port (**16**), said outlet port (**18**) and said injector (**22**) are carried by a head (**11**) of the engine (**1**), said head (**11**) being arranged in abutment against an axial end of said cylinder (**2**) and delimiting with said piston (**12**) and with the cylinder (**2**) a combustion chamber (**15**);

said engine (**1**) further comprising at least a first spark plug (**24**) mounted on said head (**11**) in a position adjacent to said injector (**22**) and acting inside said combustion chamber (**15**) for cyclically and selectively determining the ignition of the mixture formed by fuel and air present in the combustion chamber (**15**) and for triggering the combustion reaction;

characterised in that it further comprises:

a pre-chamber (**26**), delimited towards said combustion chamber (**15**) by a wall (**30**), communicating with the combustion chamber (**15**) through one or more free connection ports (**27**) and fed with a mixture of air and fuel, and

a second spark plug (**28**) acting inside said pre-chamber (**26**) for cyclically and selectively determining the ignition of the mixture present in the pre-chamber (**26**) and triggering the combustion reaction;

said first spark plug (**24**) being arranged in an intermediate position between said pre-chamber (**26**) and said injector (**22**).

2. The engine according to claim **1**, wherein said pre-chamber (**26**) is only fed with the mixture of fuel and air present in said combustion chamber (**15**) during the movement of said piston (**12**) towards said head (**11**) with a consequent compression of the mixture itself.

3. The engine according to claim **1**, wherein said pre-chamber (**26**) is carried by said head (**11**) in a substantially central position in respect to said cylinder (**2**).

4. The engine according to claim **1**, wherein said pre-chamber (**26**) is delimited towards said combustion chamber (**15**) by a convex wall (**30**) protruding inside said combustion chamber (**15**) and bearing said one or more connection ports (**27**).

5. The engine according to claim **1**, wherein said pre-chamber (**26**), said first spark plug (**24**) and said injector (**22**) are arranged along a line transversal to said longitudinal axis (A).

6. The engine according to claim **1**, wherein said head (**11**) is divided by a centreline plane (P) of said cylinder (**2**), containing said longitudinal axis (A), in;

an intake region (**11***a*) including said intake port (**16**) and arranged on one side of said centreline plane (P); and in

an outlet region (**11***b*) including said outlet port (**18**) and arranged on an opposite side of said centreline plane (P);

and wherein said injector (**22**) is mounted in said outlet region (**11***b*) of said head (**11**) in a position adjacent to said outlet port (**18**).

7. The engine according to claim **6**, wherein said head (**11**) is delimited towards said piston (**12**) by a concave surface (**23**) facing the piston (**12**); and wherein said intake regions (**11***a*) and outlet regions (**11***b*) are at least partially facing one another.

8. The engine according to claim **1**, wherein said injector (**22**) and the group formed by said intake port (**16**) and by said intake duct (**6**) are configured to emit inlet flows (F**1**, F**2**), respectively of the fuel and the air, converging between one another towards the centre of said combustion chamber (**15**).

9. The engine according to claim **1**, comprising a plurality of said cylinders (**2**) arranged facing one another in one or more banks (**3***a*, **3***b*) arranged at an angle between one another, a plurality of said combustion chambers (**15**) and, for each said cylinder (**2**), at least one said intake port (**16**), at least one said outlet port (**18**), at least one said intake valve (**20**), at least one said outlet valve (**21**), at least one said injector (**22**), at least one said pre-chamber (**26**), at least one said first spark plug (**24**) and at least a second said spark plug (**28**) acting inside said pre-chamber (**26**).

10. A method for controlling an internal combustion engine (**1**) according to claim **1**, characterised in that it comprises the steps of:

driving said first spark plug (**24**) in a first operating condition of said engine (**1**); and

driving said second spark plug (**28**) inside said pre-chamber (**26**) in a second operating condition of the engine (**1**) different from said first operating condition.